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Catastrophe Insurance Futures

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On December 11, 1992, the Chicago Board of Trade began trading the first futures contract tailored specifically for the insurance industry. This contract, termed Catastrophe Insurance Futures, is intended to serve as a new form of risk shifting for the insurance industry and a low cost alternative to reinsurance.

The insurance industry, however, has barely participated in the Catastrophe Insurance Futures market. The reluctance to trade Catastrophe Futures can be blamed partly on regulatory restrictions and, perhaps, the structure of the contract. But another important reason for low participation by insurers in the Catastrophe Futures market is a lack of understanding of how futures work in general and how the Catastrophe Futures contract works in particular.

This article explains the new contract to insurance practitioners. It also shows how futures markets can be a useful tool for insurance companies to manage total financial risk.

Futures

The term **futures** applies to a standardized form of economic transaction in which the commitment to engage in an exchange is made at a time significantly before the transaction is completed. Many kinds of financial commitments are made well ahead of the time the exchange is made. A househunter may commit to purchase a house at a given price three months later. A car dealer may agree to deliver a particular type of vehicle at a predetermined price on some later date. A contractor may agree to perform a certain task

by a particular completion date. All these examples illustrate commitments to future economic transactions, but they are not considered futures contracts.

Two special features distinguish a **futures** contract from other forms of commitments to trade at a later date. First, the contract is standardized as to exactly what is being traded and when and where the delivery will occur. Wheat futures, for example, indicate the classification and type of the wheat to be traded, such as #2 Hard Red Winter Wheat, and the location where delivery will be made. By having a limited number of standard contracts, rather than allowing each pair of traders to engage in a different type of transaction, the trading of futures is simplified and trading in each of the contracts is increased.

The second distinguishing feature of a futures contract is that it involves three parties to the transaction. An intermediary, the **futures exchange**, participates in every futures contract. The exchange stands in the middle as a guarantor to every contract issued. In fact, neither side of the contract needs to know the identity of the other side, since the exchange stands ready to uphold the contract if either party defaults.

These two special features make futures contracts extremely liquid, meaning that it is easy to buy or sell these contracts. Buyers and sellers can readjust their holdings quickly and inexpensively. In fact, most traders in futures do not intend to deliver or take delivery of the item covered by the futures contract. Sometime after the initial trade and prior to the

delivery date, the trader reverses the initial transaction. Thus, a trader that initially bought a futures contract would later sell a similar contract, essentially negating the first trade and gaining protection against further price changes. The reasons that a trader would buy a futures contract without intending to hold it until expiration are either:

1) to profit from an expected change in price of the futures contract (speculator)

or 2) to reduce total operating risk of an organization by taking a position in futures that is expected to move inversely with some factor that affects profitability in general (hedger)

History and Examples

The Chicago Board of Trade, the futures exchange that introduced catastrophe insurance futures, is the oldest and one of the largest of the futures exchanges in the United States. They have been in operation since 1842. The first futures were based on agricultural commodities and these remain the easiest basis for understanding how futures markets function. However, futures contracts are now traded which are based on metals, petroleum products, and financial assets, in addition to agricultural commodities.

When the buyer and seller of a futures contract enter into the agreement, no money changes hands. A buyer does not make a payment

to the seller in exchange for the commitment of the seller to deliver a commodity at some later date for a set price. (This type of transaction would be similar to an option, rather than a future.) Instead, the buyer and seller agree upon a price, to be paid in the future, at which the transaction will take place. Both buyer and seller post a deposit, termed a **margin**, with its broker so the futures exchange is assured that the transaction can be completed. Only after the futures contract is made does money begin to change hands. If the consensus price of the futures contract, as represented by the price established by later trades by other participants, shifts from the one agreed to by the initial buyer and seller, then funds are drawn down from the account of the side adversely affected and paid to the account of the other side of the transaction. This transaction is called **marking to market**.

For example, if a buyer and seller agreed to trade 5,000 bushels of corn in July, 1994, for $2.53 per bushel, each would post a margin (of, for instance, $1,265) with its broker. This represents a trade of one futures contract for corn. As long as July 1994 corn futures continued to trade at $2.53, nothing further would happen. However, if the price on these futures increased 7 cents to $2.60 per bushel, then the seller would have its account debited by $350 (.07 times 5000), and the buyer would have that amount credited to its account. If, while the July 1994 corn futures are still trading at $2.60 per bushel, the buyer then closed out its position by selling one July 1994 corn futures at the $2.60 per bushel price then, again, no money would change hands

due to the futures transaction. This trader would not be subject to any further price risk and would have realized a gain of $350 on the transaction, with the gain occurring when the futures price changed. The buyer in this case may have been a speculator, anticipating, correctly in this instance, a price increase in corn futures. Or the buyer may have been a hedger, concerned about the adverse impact of a price increase in corn on other operations. A bakery or cereal company would be in this position. In this case, the adverse impact of the increase in corn prices is offset by the financial gain on the futures contract.

Interest Rate Futures

One of the most useful types of futures contracts for insurers is the interest rate future. Interest rate futures are similar to agricultural futures in that they lock in a price for purchase or sale at a later date. Rather than fixing a price for wheat, an interest rate future fixes the price of a standardized fixed income security. Locking in the price at which one can buy or sell a bond, of course, locks in the lending or borrowing rate at that future date.

The two most popular interest rate futures contracts are based on Treasury bonds and on 90-day Eurodollar CDs. The Treasury bond contract, traded at the Chicago Board of Trade, represents long-term interest rates. The Eurodollar contract, traded at the Chicago Mercantile Exchange, represents the shorter end of the

yield curve. Though other interest rate futures trade, most users prefer these two contracts because of their superior liquidity.

Futures can be used as substitutes for a purchase or sale of an actual bond. Though they come only in standardized maturities and quantities, they are very cheap to buy or sell, both because of the high liquidity of the futures market and because the margin requirements are low. Buying a T-Bond future can be a substitute for the purchase of a bond; selling a futures contract can substitute for the sale of a bond.

If a portfolio manager knows that he will have more funds to invest soon and is concerned that interest rates may fall, he can buy bond futures now to lock in the current rate. Then, when he gets the funds to invest, he can close out the futures position and buy the actual bonds. If interest rates have fallen, his bond futures position will show a profit. This should then offset the higher price he will have to pay for the actual bonds. The results should be the same as though he invested the funds at the old, higher interest rate. If interest rates rise, then he will incur a loss on the futures contract which will be offset by higher investment income. Once again, the net result will be the same as though the funds were invested at the original interest rate. This strategy is known as a long hedge.

As you can see from the example above, the proper futures position can improve overall performance, but may substantially alter cash flows. At times, this is an advantage. Insurers generally prefer not to sell bonds that have fallen in value, since

this reduces statutory surplus and thus limits their ability to write premiums. If rates are expected to increase, a sale of the bond itself would protect a manager from a loss. However, selling the bond might mean taking a substantial capital loss. By selling a bond future instead, a manager can receive the same economic result without taking an accounting loss. After the short position in bond futures has been taken, an increase in interest rates still results in a loss on the bond portfolio, but this is now offset by a gain on the short futures position. This strategy is known as a short hedge.

Since interest rate futures are based on a standardized bond, the value of the manager's bond portfolio and futures prices may not move exactly together. This may mean that the losses and gains from the either of two strategies detailed above may not exactly balance out. If the prices of the bonds in the manager's portfolio move down by more than the standardized bond on which the futures contract is based, the manager will be faced with a net loss. However, the net loss will be much lower than if he hadn't hedged, due to the gain from the futures position.

The exact number of futures to buy or sell in either of the strategies described above is not obvious. There are several approaches to determine the proper hedging strategy. One approach, the simplest, calls for a futures position which represents the same total face value as the actual bond position which the manager wishes to hedge. Each Treasury bond futures contract represents $100,000 of face value. A second approach decreases the futures

position to allow for the fact that the standardized futures bond and the actual bond portfolio are less than perfectly correlated. The decrease is greater the less closely the value of the hedged portfolio moves with the futures price, with the correlation measured historically. A third approach is based on duration measures: the bond portfolio may be immunized by matching the duration of the futures position to the duration of the manager's bond portfolio.

Financial institutions such as banks, life insurance companies, mutual funds, and pension funds use interest rate futures widely to reduce their risk. The CBOT's Treasury bond contract is the most widely used and highest volume of all futures. The success of interest rate futures has led the futures exchanges to look for other new products, including catastrophe insurance futures.

Catastrophe Insurance Futures

Several developments combined to encourage the CBOT to create insurance futures. First, property-liability insurance companies, despite controlling over $650 billion in assets (1992), have very minor participation in the futures markets. Insurance futures are designed to get this industry more interested in investing in futures, both insurance and other contracts. Second, the primary method for property-liability insurance companies to reduce underwriting risk is reinsurance. The unprecedented series of

insured catastrophes in 1992 and the financial difficulties of Lloyd's of London has seriously eroded the capacity of traditional reinsurance sources. Insurance futures are an alternative device for hedging insurance risk that could be especially helpful when access to reinsurance markets is restricted. Also, the CBOT is engaged in competition with other futures exchanges to develop and market contracts. Trading volume in existing contracts has been sluggish in recent years, leading all the exchanges to try to develop innovative contracts to increase trading volume. Futures contracts on a number of other unusual bases, including pollution credits, fertilizer, the relationship between different foreign currencies, frozen shrimp, and a stock index specifically on mid-sized companies, are all being developed. Most new futures contracts are likely to fail and be discontinued, but the potential profits for the exchanges on successful new contracts fosters continued new efforts.

The CBOT investigated establishing insurance futures on automobile collision coverage, homeowners insurance and health insurance before deciding to begin trading in the catastrophe insurance futures. By basing the contract on catastrophic losses, this contract had the advantages of being potentially more useful to a wider selection of insurers. If properly structured the value of the contract could be predicted based on historical catastrophe losses, and the price of this contract would vary in line with the most unpredictable of insured losses. Once the CBOT decided to offer catastrophe insurance futures, the primary problem became on

what to base these contracts.

Selecting an Index for Catastrophe Futures

The price for a future based on a tangible commodity, such as gold, corn, or heating oil, depends on the participants' anticipated price of that commodity at the time the future transaction is to occur. Sometimes that price is a function of the current cost of the product loaded for the cost of storing the commodity and foregone interest income on the funds used to acquire the item. Thus, the price of gold futures is generally higher than the current price of gold, as a futures trader could always buy gold now and store it until the date when the futures contract matures, but only by tying up his capital. For other commodities, the price is based on anticipated supply and demand for the commodity as of the future date. Grain futures prices are generally lower for early fall months when harvests are expected to increase the supply available for sale, depressing prices. In either case, there is both a current price of the commodity, called the spot price, and a price at the future date at which the seller of the futures could then buy the commodity and deliver it to the buyer of the futures to fulfill its obligation under the futures contract. These commodity prices provide a basis for establishing the price of the futures contract. However, there is no spot price for catastrophic losses which can be used to establish catastrophe insurance futures prices.

Estimates of insured catastrophe losses are available on individual catastrophes since 1949, as compiled by the Property Claim Services division of American Insurance Services Group, Inc. Unfortunately for insurance futures purposes, these are only estimates made by PCS after surveys with a sample of insurers shortly after each catastrophe. Since estimates of the size of catastrophes could be subject to manipulation to benefit market participants, the CBOT needed a verifiable source to use as the basis of the new futures contract. The total of individual claims paid on each catastrophe would serve as a perfect source of catastrophe losses, but, again unfortunately for the purposes of insurance futures, the coding of catastrophe numbers on claims was discontinued by Insurance Services Office, the largest statistical agency in the property-liability insurance business, in the late 1970s. Thus, in order to obtain verifiable values of losses in line with catastrophe claims, the CBOT adopted an alternative index to use in settling insurance futures contracts.

The CBOT contracted with ISO DATA to generate statistical information on claims resulting from losses that tend to be catastrophic in nature. Losses caused by wind, hail, earthquake, riot and flood tend to be the result of catastrophic, rather than individual, losses, and, thus, these causes of loss were selected to be included in the index compilation. All losses coded with the cause of loss codes listed in Table 1 which are reported to ISO by companies included in the sample will be used to generate the catastrophic loss total:

TABLE 1: Line	Cause of Loss
Homeowners	Wind and Hail
Commercial Multiperil	Winds, Hail and Riot
Earthquake	Earthquake
Fire	Wind, Hail and, for Commercial Fire, Riot
Allied	Wind, Hail and, for Commercial Allied Lines, Riot
Auto Physical Damage	Wind, Hail, Earthquake, Riot, and Flood
Farmowners	Wind, Hail and Riot
Commercial Inland Marine	Wind, Hail, Earthquake, Riot and Flood

The market share of the insurers included in the ISO sample varies significantly by line and by state. For example, the sample includes 60.5 percent of the industry's Commercial-Multiperil in Wyoming, but only 2.3 percent of Wisconsin's Farmowners premium. To develop an index value that approximates the industry's total losses from a catastrophe, the losses reported to ISO are multiplied by a factor (1/market share of sample insurers) on a by line, by state basis. For example, if the total losses from wind, hail and riot in Wyoming totaled $1 million for a particular reporting period, then the value included in the index would be $1,652,893 ($1,000,000 times 1/.605).

The index value used to settle catastrophe insurance futures will thus be only an approximation of the catastrophe losses the industry experiences. If insurers in the ISO sample are hit by a particular disaster more heavily than the industry, the index value

will be an overestimate of industry losses. Conversely, if the sample insurers are fortunate in a particular storm and have losses below the level of the rest of the industry, the index value will be an underestimate. Although this random variation could cause problems for insurers in determining the proper use of catastrophe insurance futures to hedge their own losses, it is unavoidable if full detail on catastrophe losses for the industry is not available.

Establishing a Futures Price

Catastrophe insurance futures are established for each quarter of the year beginning with the fourth quarter of 1992. For each quarter, four contracts are offered, for the entire country (National) and for three subdivisions - Eastern, Midwestern and Western. The date associated with each quarter is unnecessarily confusing, because the quarter is dated by the cutoff month for reporting a losses to ISO, which is three months after the end of the actual calendar quarter when the loss was incurred. Thus, the first contract is the March 1993 contract. This covers losses that occur in the fourth quarter of 1992, from October 1 through December 31. These losses must be reported to ISO by March 1993. These contracts will trade until July 5, 1993, by which time ISO DATA will have compiled the individual company loss reports and calculated the total index value. At that time, any open futures position will be settled at the indicated price. Unlike commodity

futures, no delivery of the underlying commodity can take place.

The final price at which catastrophe insurance futures will settle is:

$$\$25{,}000 \times (\text{Incurred Catastrophic Losses}) / (\text{Estimated Property Premium})$$

ISO DATA will calculate and supply the value of incurred catastrophic losses. This is the only value in the formula which is unknown during the life of the contract. The denominator, estimated property premium, is set by the CBOT before the futures contract begins trading. This value is an estimate of all the property insurance premiums, industry wide, for the geographic area covered by the futures contract. These values represent the premiums that are subject to catastrophic losses, excluding any portion of a line's premium that covers liability or, for automobile physical damage, collision. The premiums to be used for all quarters from the fourth quarter of 1992 through the second quarter of 1994 are listed in Table 2.

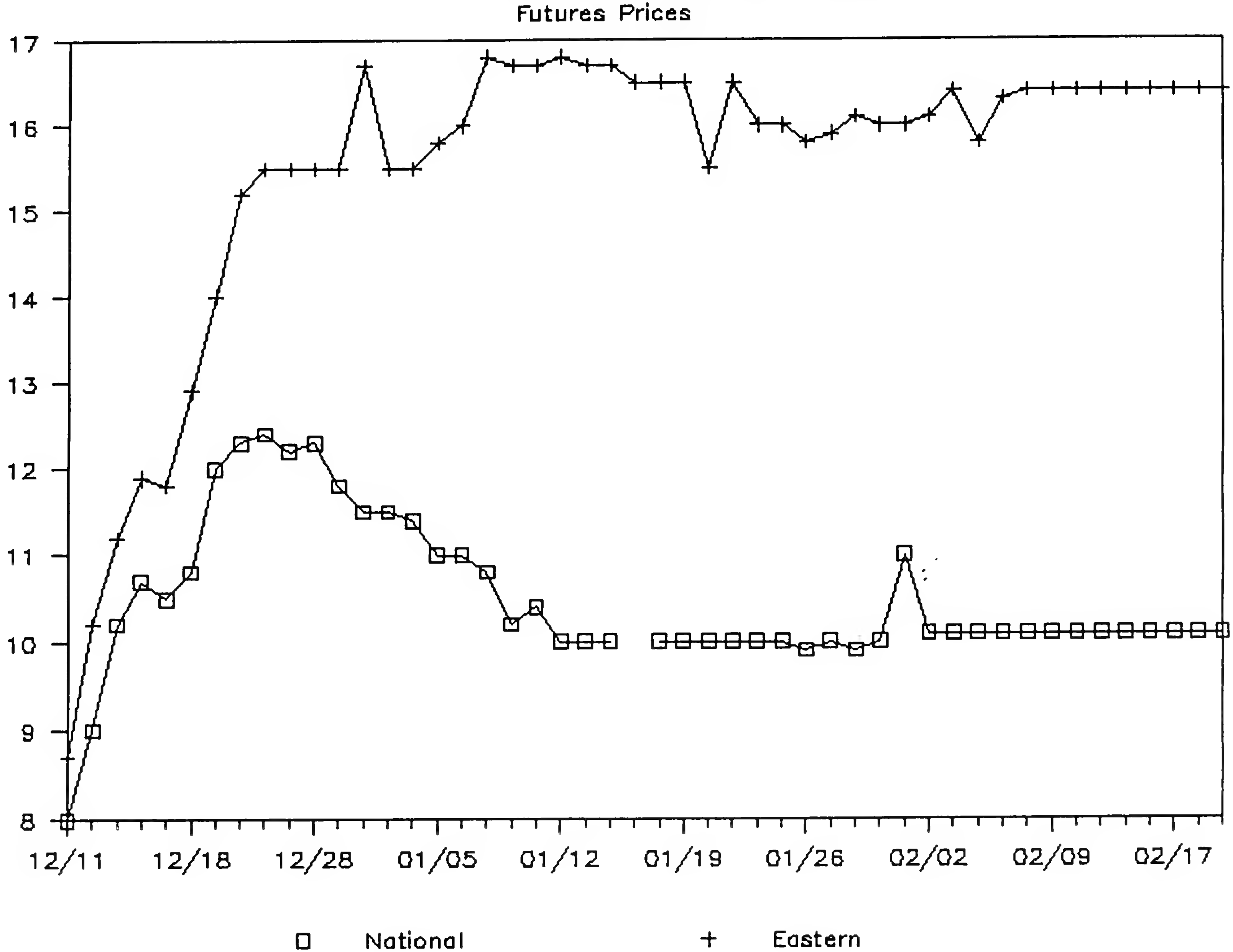
TABLE 2:

Contract:	Estimated Property Premium
National	$12,242,060,112
Eastern	5,718,769,160
Midwestern	3,968,805,577
Western	2,848,444,165

The regional numbers do not add to the National total because Texas is included in both the Eastern and Midwestern contracts

Prices for futures contracts are quoted in percentage points.

Figure 1: Catastrophe Futures



Thus, on the first day of trading, December 11, 1992, the price of the March 1993 National Catastrophe Insurance futures contract of 8.0 (see Figure 1) meant that the cost of one insurance futures contract cost $2,000 (8 x .01 times $25,000). This contract covers losses occurring during the fourth quarter of 1992. This means that the consensus estimate of expected catastrophic losses for the fourth quarter of 1992 was $979,364,809, since:

$2,000 = $25,000 x ($979,364,809/$12,242,060,112)

By March 15, 1993, the price of that contract had increased to $2550 (.102 x $25,000), which meant that the estimate of losses had increased to $1,248,690,131, since:

$2,550 = $25,000 x ($1,248,690,131/$12,242,060,112)

The increase in the estimated incurred losses was very likely the result of the East Coast storm in December.

Actual CBOT Contract Trading

In this example, we will use the actual prices of catastrophe futures contracts to explain the results of buying or selling a futures contract. The futures prices were reported in the Wall Street Journal for the first few weeks of trading; subsequent prices were obtained directly from the CBOT. The Eastern contract is more actively traded than the National contract, so we will use that contract in our examples. In each case, we will use the settlement price. The settlement price each day is normally the daily close, and is used to mark the trader's position to market.

The settlement price of 8.7 at the close of the first day's trading translates into:

$$.087 = (\text{Incurred Catastrophic Losses})/(\text{Estimated Property Premium})$$

$$\text{Value of Contract} = \$25{,}000 \text{ X } .087 = \$2{,}175$$

In this example, we will present the results of buying one contract rather than a more realistic hedge. Most companies would probably need to buy hundreds of contracts to adequately hedge their exposure to catastrophes. Trading is still so thin that an attempt by a large company to purchase several hundred contracts would significantly alter the price.

We assume initial margin to be $270 per contract, and maintenance margin to be $200 per contract. Thus, for each catastrophe insurance futures purchased, each trader, whether buyer or seller, has to post $270 with his broker. Whenever the margin account falls below $200 per contract, that trader must deposit enough money to bring the balance back up to at least $270. These margin requirements approximate values given in briefings by the CBOT.

For each day, the settlement price is as given in the paper. The total value of a contract is the settlement price times $25,000. The daily gain or loss is the change in the settlement price times $25,000. Total gain or loss is the cumulative sum of the daily gain or loss.

In our example, the trader buys one futures contract on the

first day of trading, 12/11/92. He holds the position until 1/14/93, when he offsets it by selling one futures contract. The broker requires a deposit of $270 before the position is established. This deposit, plus any gains or losses, is returned to the trader when the position is closed on 1/14/93.

In this example, the change in contract price between 12/11 and 1/14 gives a total gain of (.167-.087)*$25,000 or $2,000. Note that the balance in the margin account is adjusted each day based on the current price of the future: when the futures price rises, a trader who has bought a future is credited with the change in the price times $25,000; when it falls, the trader is debited by the change in price times $25,000. A futures seller would have been debited for a price rise and credited when the price falls, by the same amounts.

TABLE 3: EXAMPLE 1: March '93 Eastern Catastrophe Future						
Date	Settle Price (%)	Total Value of a Contract	Change in Settle Price	Daily Gain or Loss	Total Gain or Loss	Account Balance
12/11	8.7	$2,175				$270
12/14	10.2	$2,550	1.5	$375	$375	$645
12/15	11.2	$2,800	1.0	$250	$625	$895
12/16	11.9	$2,975	0.7	$175	$800	$1,070
12/17	11.8	$2,950	-0.1	($25)	$775	$1,045
12/18	12.9	$3,225	1.1	$275	$1,050	$1,320
12/21	14.0	$3,500	1.1	$275	$1,325	$1,595
12/22	15.2	$3,800	1.2	$300	$1,625	$1,895
12/23	15.5	$3,875	0.3	$75	$1,700	$1,970
12/24	15.5	$3,875	0.0	$0	$1,700	$1,970
12/28	15.5	$3,875	0.0	$0	$1,700	$1,970
12/29	15.5	$3,875	0.0	$0	$1,700	$1,970
12/30	16.7	$4,175	1.2	$300	$2,000	$2,270
12/31	15.5	$3,875	-1.2	($300)	$1,700	$1,970
01/04	15.5	$3,875	0.0	$0	$1,700	$1,970
01/05	15.8	$3,950	0.3	$75	$1,775	$2,045
01/06	16.0	$4,000	0.2	$50	$1,825	$2,095
01/07	16.8	$4,200	0.8	$200	$2,025	$2,295
01/08	16.7	$4,175	-0.1	($25)	$2,000	$2,270
01/11	16.7	$4,175	0.0	$0	$2,000	$2,270
01/12	16.8	$4,200	0.1	$25	$2,025	$2,295
01/13	16.7	$4,175	-0.1	($25)	$2,000	$2,270
01/14	16.7	$4,175	0.0	$0	$2,000	$2,270

In our second example, the trader has worse luck. The trader buys one contract on 1/18/93, and closes it out on 1/29/93. Since there is no price change on the 19th, the margin account balance

does not change. On the 20th, a price drop results in the trader losing most of his brokerage account balance.

The $20 remaining is too low to protect the broker against default risk. The broker will demand an additional deposit any time the balance falls below the maintenance margin level, which we will assume is $200. When the account balance falls below this trigger level, the broker will demand that the trader deposit sufficient funds to bring the total back up to the initial margin level of $270. Thus, the trader has put up a total of $270 + 250 = $520; his account balance is now $270. The next day, the price moves in our trader's favor, giving him an additional $250. This brings the account balance up to $520. When the position is closed, the account balance will be $395. The trader has deposited $520. Thus, overall, the trader has made a $125 loss.

TABLE 4:

EXAMPLE 2: March '93 Eastern Catastrophe Future

Date	Settle Price	Total Value of a Contract	Change in Settle Price	Daily Gain or Loss	Total Gain or Loss	Account Balance (Close of Day)
01/18	16.5	$4,125				$270
01/19	16.5	$4,125	0.0	$0	$0	$270
01/20	15.5	$3,875	-1.0	($250)	($250)	$20

Since the account balance is less than the maintenance margin of $200, the investor will be required to bring the balance back up to the initial margin level of $270, requiring a further deposit of $250. The account balance the next morning must be $270, or the position will be offset by the broker.

Date	Settle Price	Total Value of a Contract	Change in Settle Price	Daily Gain or Loss	Total Gain or Loss	Account Balance (Close of Day)
01/21	16.5	$4,125	1.0	$250	$0	$520
01/22	16.0	$4,000	-0.5	($125)	($125)	$395
01/25	16.0	$4,000	0.0	$0	($125)	$395
01/26	15.8	$3,950	-0.2	($50)	($175)	$345
01/27	15.9	$3,975	0.1	$25	($150)	$370
01/28	16.1	$4,025	0.2	$50	($100)	$420
01/29	16.0	$4,000	-0.1	($25)	($125)	$395

When position is closed, the balance in the margin account ($395) is returned to the investor. The net loss on the position is $270 initial margin + $250 cash infusion on the morning of the 21st, minus $395, or $125.

Problems with the Catastrophe Contract

The first and greatest problem with catastrophe futures is that very few of them are traded. Actively traded futures contracts, such as the S&P500, provide extremely low transactions costs and unparalleled liquidity. The catastrophe contract is not yet actively traded. Many potential participants won't trade because no-one else is trading.

Most of the trading costs in a futures market result from the price impact of a trade. As the contract builds up some volume, the price impact of a given purchase or sale will decrease. This will make the contract useful for more traders, which in turn will increase the volume. Because of this positive feedback effect, futures contracts are often either very liquid or very illiquid.

The second problem with insurance futures is that they are standardized. No insurer's losses correlate perfectly with national catastrophe losses. If the catastrophe futures price moves by a different amount than the losses of an individual insurer, the insurer's losses and gains will not exactly cancel. This implies that the catastrophe future will not be the ideal protection for everybody. However, it may give adequate protection to a large number of insurers.

An additional problem is that there are no obvious catastrophe futures sellers. Most insurers would be able to reduce their risk by buying futures. For many of the most successful futures contracts, there are both long and short hedgers. For instance, for corn futures, a grain dealer would hedge by selling futures, and a cereal manufacturer would hedge by buying futures. Not all successful futures have balanced hedging demand; Treasury bond futures, the most successful contract of all, has predominately short hedging demand. We don't know that balanced hedging demand is a necessary condition for contract success, but evidence from the agricultural futures markets suggests that it helps.

Another potential problem with the contract is ensuring its

financial integrity. Futures markets have a complex system by which the exchange clearinghouse monitors and guarantees the contracts against default. This system is designed to deal with contracts for which the price fluctuates widely. The marking to market system involves very large cash flows. This system weathered the Crash of 1987 without breaking down. Could it also have weathered Hurricane Andrew?

The CBOT has anticipated that there are some shocks which could jeopardize the exchange guarantee system. In response, it has limited the total contract value to $50,000 (which would occur if the loss ratio in the index were 200 percent). Hurrricane Andrew would have triggered the cap on the Eastern contract, but not the National contract. This cap, similar to coverage limits on reinsurance, limits the protection insurance futures can provide.

In addition, there are limits on how much the price can move in a day. These daily trading limits are intended to help the system adjust to sudden changes in value. By spreading a large price change over several days, they make it easier for participants to deal with the cash flows involved in the mark-to-market process. Since they frequently result in a trading halt, they may also calm the market.

Comparison of Catastrophe Futures with Reinsurance

Insurance futures are claimed to provide insurers with an alternative to reinsurance. As a result of a capacity shortage

worldwide for reinsurance, and most notably for catastrophe reinsurance, an acceptable substitute for reinsurance would be very useful.

Reinsurance allows an insurer to reduce overall underwriting risk by transferring some of the losses the insurer may experience to the reinsurer. Quota and surplus share reinsurance provide for the insurer and reinsurer to share premiums and losses proportionally either on one overall percentage (quota) or determined based on the size of the policy (surplus). These forms of reinsurance reduce the maximum loss the insurer can experience on an individual risk and provide surplus relief for the insurer. Non-proportional reinsurance focusses on large losses, with the insurer covering losses up to the retention and the reinsurer covering all or a significant portion of the excess. Excess of loss reinsurance deals with individual losses. Aggregate excess, or catastrophe reinsurance, provides coverage when any single occurrence causes a loss to more than one policyholder that, in aggregate, exceeds the retention. This coverage does not apply in the event of a large loss to a single exposure, but applies when more than one exposure incurs a loss from a common occurrence, generally some form of catastrophe. Stop loss reinsurance provides for the reinsurer to bear some portion, generally slightly less than 100 percent, of all losses that cause the insurer to have a loss ratio over a set value. This reinsurance provides coverage regardless of the size of individual losses or whether a common occurrence generated the losses.

In addition to these traditional forms of reinsurance, financial reinsurance has become a common method of risk shifting. Financial reinsurance provides coverage similar to traditional reinsurance, but limits the reinsurer's exposure to loss through contract provisions that restrict the right of the insurer to terminate the contract when the reinsurer has a cumulative loss on the contract. However, recent accounting regulations, including Financial Accounting Standards Board statement 113 and recent rulings on funded catastrophe covers, are expected to impair the effectiveness of this form of reinsurance.

Catastrophe insurance futures could provide a method for an insurer to reduce risk, but in a manner that is quite different from reinsurance. Assuming that an insurer would incur losses in line with industry catastrophe experience, then when a catastrophe increases the losses of the insurer, the price of the insurance future will increase. The investment gain on the futures position would offset the increase in incurred losses. Thus, purchasing catastrophe insurance futures could reduce the overall operating risk of an insurer. However, using futures would be very different from using reinsurance. Reinsurance deals with an insurer's own losses; the catastrophe insurance futures price is based on, in essence, industry losses. Reinsurance reduces net premiums and incurred losses on financial reports; futures would affect investment income, not premiums and losses. Reinsurance transactions take place between two parties that do, or should, know each other; futures transactions are anonymous. Reinsurance

transactions require developing individualized contracts that are time consuming to prepare; futures are standardized and can be executed immediately.

As a result of these distinctions, catastrophe insurance futures would be a substitute for reinsurance only for large, diversified insurers that do not require surplus relief, have a book of business that is fairly evenly spread over the entire area covered by the futures contract and not concentrated in any one locality, and do not require the technical expertise of a reinsurer. The ability to purchase futures without sharing internal company data and to change the amount of coverage held (futures contracts owned) quickly and anonymously could be an advantage of futures over reinsurance.

Regulations

The regulations for property-liability insurers of most states either are silent about futures or allow investment in futures to fall under the miscellaneous category, which allows 5 to 10 percent of surplus to be invested in these assets. Recent regulations in New York specifically allow for investment in interest rate and stock index futures to the extent this investment represents a bona fide hedging strategy. Previously, New York regulations prohibited investments in futures. This change should increase the use of financial futures by property-liability insurers.

The only state that has enacted regulations regarding

insurance futures is Illinois. The definition of the term **financial futures** contract was expanded to include insurance futures and there are specific requirements that any investment in financial futures be established to hedge "price, valuation, interest rate or... underwriting or insurance related risk."

The conservative nature of insurance regulation has served to restrict the involvement of property-liability insurers in financial futures of all types. Now that the CBOT is trading futures specifically geared to insurance risk, regulators are likely to pay more attention to the futures market and, eventually, develop regulations that allow insurers to participate in these markets to the extent that risk can be reduced. Thus, insurers will have the opportunity to invest in catastrophe insurance futures and other financial futures.

Conclusion

Catastrophe insurance futures are an interesting attempt by the CBOT to provide insurers with an new method for shifting risk. This innovation is being introduced at an opportune time, given recent catastrophic losses and a reduced worldwide reinsurance capacity. However, technical problems with the method of computing the index to be used to settle these futures may limit insurer interest. The index is not exactly catastrophe losses, but all losses with selected natural hazard cause of loss codes, and the value is determined by extrapolating industry exposure from a

sample of insurers. Thus, no reliable historical record that is comparable with the index values is available. Insurers are likely to wait until a reasonable record of the index values is established before deciding to use these insurance futures. Unfortunately, the CBOT may not be able to continue to support insurance futures that long. If an index value the closely approximated the historical catastrophe record were used, then interest might develop more quickly. One method for getting a more accurate index value would be to reinstitute catastrophe codes on loss reports to ISO and other statistical agencies. The rationale for dropping this code, a limitation of the number of fields available for coding, is no longer applicable. The availability of reliable catastrophe loss data would be helpful to the industry for a number of purposes, in addition to facilitating catastrophe insurance futures. Planning and accounting for contingencies, forecasting catastrophes, settling reinsurance contracts and measuring industry exposure all could be done more accurately if insurers coded losses for individual catastrophes.

The need for risk transfer tools will continue to grow for the insurance industry. Catastrophe insurance futures are one response to this need. Although these instruments may not survive, the interest that they have attracted and the knowledge about futures markets in general that they have sparked may foster a greater usage of other forms of financial futures by property-liability insurers. This new investment opportunity could be a significant benefit to both the futures exchanges, in new business, and the

insurance industry, in a reduction in total operating risk.

If you're interested in reading further:

On Insurance Futures:

Chicago Board of Trade. Catastrophe Insurance Futures and Options: A Reference Guide. Chicago: Chicago Board of Trade, 1992.

D'Arcy, Stephen P., and Virginia Grace France, "Catastrophe Futures: A Better Hedge for Insurers," Journal of Risk and Insurance, December, 1992.

Goshay, Robert C., and Richard L. Sandor, "An Inquiry into the Feasibility of a Reinsurance Futures Market," Journal of Business Finance, vol 5(2), 1973.

Niehaus, Greg and Steve Mann, "The Economics of Insurance Futures," Journal of Risk and Insurance, December, 1992.

On Using Futures to Hedge Financial Risk:

Figlewski, Stephen. Hedging with Financial Futures for Institutional Investors: From Theory to Practice Cambridge, Mass: Ballinger Publishing Company, 1986.

Smith, Clifford W., Charles W. Smithson, and D. Sykes Wilford, Managing Financial Risk. Grand Rapids, Michigan: Harper and Row, Publishers, 1990.